



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,196	03/30/2001	Thomas H. Baum	510	1232

25559 7590 08/15/2003

ATMI, INC.
7 COMMERCE DRIVE
DANBURY, CT 06810

EXAMINER

KIELIN, ERIK J

ART UNIT PAPER NUMBER

2813

DATE MAILED: 08/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/823,196

Applicant(s)

BAUM ET AL.

aw

Examiner

Erik Kielin

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5, 8-12, 16, 37 and 86 is/are pending in the application.
- 4a) Of the above claim(s) none is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 8-12, 16, 37 and 86 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 19 June 2003 has been entered.

Drawings

2. The drawings were received on 19 June 2003. These drawings are acceptable.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5, 11, 12, and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,583,205 (Rees, Jr.).

Regarding claims 1 and 37, Rees discloses a CVD (chemical vapor deposition) precursor composition for forming a thin film dielectric on a substrate, including at least one metalloamide source reagent compound, or a vapor source reagent mixture including a metalloamide source reagent compound, having the formula

Art Unit: 2813

$$M(NR_1R_2)_x(NR'_1R'_2)_y$$
 (col. 5, line 20; col. 6, line 45)

wherein M is a metal selected from Li, Zn, Y, La, lanthanide and actinide series elements (called the "F-series"), (Abstract; col. 6, lines 27-30; col. 7, Table 1); N is nitrogen; each of R_1 , R_2 , R'_1 , and R'_2 is the same or different and is independently selected from of alkyl, alkenyl, aryl, C_1 - C_8 alkyl, C_1 - C_8 perfluoroalkyl, alkylsilyl (col. 3, lines 24-43; col. 5, lines 1-28); and x is from 1 to 5 and y and from 1 to 5 and x+y is the oxidation state of metal M. (See also col. 6, lines 6-56.)

Regarding claims 2 and 3, each of R_1 , R_2 , R'_1 , and R'_2 may be methyl or ethyl (col. 3, lines 24-43; col. 5, lines 1-28).

Regarding claim 5, Hf is an F-series metal as admitted by Applicant in the Amendment filed 19 June 2003 (paragraph bridging pages 6-7) referencing the CRC Handbook of Chemistry and Physics.

Regarding claims 11 and 12, the means by which the CVD precursor may be delivered to the CVD chamber is an intended method of using of the composition and does not have patentable weight in the instant claims drawn to composition. (See MPEP 2112.01 and 2112.02.)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2813

6. Claim 8-10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Rees** in view of US 6,159,855 (**Vaartstra**).

Regarding claims 8-10, **Rees** does not indicate the solvents for the CVD precursor.

Vaartstra teaches a CVD precursor composition comprising metalloamides wherein the solvents in which the metalloamide precursor are dissolved to form the CVD precursor are disclosed at col. 8, lines 37-53. More specifically, ethers, amines, hydrocarbons (both aliphatic and aromatic) are disclosed. Further regarding claims 10, note that the C5-C10 aliphatic hydrocarbons are preferred and C8 is octane specifically.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the solvents of **Vaartstra** as the solvents in the **Rees** CVD precursor composition, because **Vaartstra** teaches that metalloamides are soluble in such solvents for the purpose of CVD. Moreover, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and

Art Unit: 2813

selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." (65 USPQ at 301).

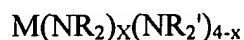
Regarding claim 16, the prior art of **Rees**, as explained above, discloses each of the claimed features except for indicating multiple metalloamide source reagent compounds.

Vaartstra teaches a CVD precursor composition comprising multiple metalloamide source reagent compounds. (See paragraph bridging cols. 6-7.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use multiple metalloamides in a CVD precursor of **Rees** to achieve a deposited layer having both metals, as taught to be beneficial in **Vaartstra**.

7. Claims **86** are rejected under 35 U.S.C. 103(a) as being unpatentable over the article **Bradley and Thomas**, "Metallo-organic compounds containing metal-nitrogen bonds. Part I. Some dialkylamino-derivatives of titanium and zirconium" Journal of the Chemical Society, 1960, pp. 3857-3861 in view of either of **Rees** and **Vaartstra**.

Bradley and Thomas discloses a CVD (chemical vapor deposition) precursor composition for forming a thin film dielectric on a substrate, including at least one metalloamide source reagent compound, or a vapor source reagent mixture including a metalloamide source reagent compound, having the formula



wherein M is a metal selected from Zr and Ti; N is nitrogen; each of R_2 and R'_2 is the same or different and is independently selected from the group consisting of C_1 - C_8 alkyl --

Art Unit: 2813

specifically ethyl, propyl, and butyl; and $x+y$ is the oxidation state on metal M. (Abstract; Table 2 on p. 3860).

Bradley and Thomas does not teach that the compounds are used as CVD precursors.

As noted above, each of **Rees** and **Vaartstra** teach that metalloamides are useful as CVD precursors.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the compounds of **Bradley and Thomas** as a CVD precursors, as taught in each of **Rees** and **Vaartstra**, because one of ordinary skill would recognize that they could be used for such purpose given their similarity to those compounds in each of **Rees** and **Vaartstra**.

Response to Arguments

8. Applicant's arguments filed 19 June 2003 (Paper No. 19) have been fully considered but they are not persuasive.

Applicant requests clarification for the disclosure in Rees of perfluoroaryl and perfluoroalkyl. Examiner was attempting to use Applicant's claim language and apologizes for the confusion. The rejection was still correct because Rees discloses the R ligands from within the group claimed by Applicant in independent claims 1 and 37.

Applicant argues at p. 6, regarding that which "the present invention is directed to" that "the present invention requires that at least two amino ligand groups be bonded to metal M and that the at least two amino groups be different. This is in error. There is no claim language making such requirement. The claims expressly states that the R substituents of the amino ligands are "independently selected from." There is no limitation requiring that the ligands be

Art Unit: 2813

different. Moreover, the instant specification discloses quite to the contrary and specifically teaches that the R substituents of the amino ligands may be the same. Accordingly, **Applicant's characterization of the present invention is in error.** (See p. 6, last paragraph of the instant specification.)

Applicant continues arguing this point at p. 7 of the response, third and fourth full paragraphs. Applicant fails to claim the requirement that the amino ligands be different. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). No such interpretation could be read into the claims for the reasons presented in the previous paragraph. Applicant's disclosure teaches away from any requirement that the amino ligands be different.

Moreover, Rees reads on the requirement of using different substituents on the amino ligands and using amino ligands by providing the generic formula and providing specific exemplary embodiments wherein the amino ligands are different. The instant claims in no manner exclude those compounds disclosed in Rees.

Applicant's arguments regarding the F-series metals are acknowledged. The F-series metals are well-known to any high school student taking a basic chemistry class and are notoriously well known to one of ordinary skill as Applicant clearly points out by use of the CRC Handbook of Chemistry and Physics. Applicant admits that the claimed metals are disclosed in Rees.

Art Unit: 2813

It is noted with interest that Applicant wishes the disclosed formula to have the entirety of breadth deserved while selectively denying that right to Rees. Examiner respectfully submits that each of the claimed features of claims 1-3, 11, 12, and 37 is anticipated by Rees.

Because Applicant's arguments contradict the facts of record, in this regard, they are not considered persuasive.

With regard to the rejection of the claims over Rees in view of Vaarstra, Applicant argues in the paragraph bridging pages 8-9 that "Rees fails to sufficiently limit or delineate metalloamide compositions **requiring** (emphasis added) two different amino groups bound to a metal center." (Emphasis in original.) For reasons already indicated, these arguments are in error. Applicant makes no such requirement in the claims, and Rees does, **in fact**, sufficiently limit the metalloamide compositions. Specific examples are given at col. 5, lines 15-28.

Moreover, Examiner respectfully submits that it is improper for Applicant to argue that the instant invention is novel over that in Rees given the innumerable compounds disclosed in Applicant's specification which are equally disclosed in Rees. **Applicant's general formula is specifically broader than that in Rees**, which contradicts Applicant's argument that Rees somehow failed to "sufficiently limit" the claimed compounds. Rather it is clearly Applicant who failed to sufficiently limit the compounds as the evidence of record makes clear, i.e. Applicant's specification, p. 6, last paragraph. In this regard there is, further, no evidence of record distinguishing the use of distinct ligands to the metal center over the use of a single type of ligand. Accordingly, the evidence of record indicates that such choice is an obvious material of material selection which is *prima facie* obvious in the absence of *unexpected* results.

Art Unit: 2813

Applicant's arguments regarding Examiner's alleged failure to meet the requirements of a prima facie case of obviousness, in the paragraph bridging pages 10-11 are acknowledged. Examiner respectfully disagrees. Examiner respectfully submits that the arguments defy logic. Applicant cannot argue on the one hand that every parameter in Rees and every parameter in Vaarstra can be made, and then make such claim in Applicant's own specification. Solubility of any organic compound is either notoriously well known or an extremely simple matter of routine experimentation.

Applicant's arguments regarding the rejection of claims 1, 4, 5, 37, and 86 over the Bradley and Thomas article in view of either of Rees and Vaarstra are noted. For the present the rejection of claims 1, 5, and 37 have been dropped since these claims are rejected by other art. Applicant canceled claim 4. Applicant argues that Zr was eliminated. This is erroneous. Claim 86 specifically recites a Zr metalloamide compound disclosed in Bradley and Thomas.

Applicant argues in the last paragraph on p. 11, that the Bradley and Thomas reference amounts to non-analogous art. Examiner respectfully disagrees. One of ordinary skill trying to synthesize or manufacture a chemical compound for CVD would very clearly seek guidance for *known* methods of manufacturing the chemical compound itself. Such guidance to synthesis of the chemical compounds would save great amounts of time and money in research, preventing the "re-inventing of the wheel." Accordingly, the Bradley and Thomas reference is very clearly analogous art because it deals specifically with the manufacture of chemical compounds of the class disclosed in Rees and Vaarstra.

Art Unit: 2813

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Erik Kielin
Primary Examiner
August 14, 2003